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USING A MODULAR OPEN SYSTEMS APPROACH IN DEFENSE ACQUISITIONS: IMPLICATIONS FOR THE CONTRACTING PROCESS

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by

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Using a Modular Open Systems Approach in Defense Acquisitions: Implications for the Contracting Process

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Abstract

This research explores the use of the modular open systems approach (MOSA) as a method for implementing an evolutionary acquisition strategy as well as the implications of using such an approach on the contracting process.

A background on evolutionary acquisition is provided highlighting the benefit of rapid development and production of weapon systems incrementally, with each increment providing an increasing level of capability. The modular open systems approach (MOSA) is identified as an enabler for the evolutionary acquisition strategy, and a brief discussion on open systems is provided.

The contractual implications of using a modular open systems approach is then discussed, focusing on each of the six phases of the procurement process. Examples of MOSA-specific contracting activities and documents are taken from recent US Navy weapons systems acquisition programs such as the Navy's Common Enterprise Display System (CEDS) program, Anti-Submarine Warfare (ASW)/Undersea Warfare (USW) Test Information Management System program, Multi-mission Maritime Aircraft (MMA) program, Littoral Combat Ship (LCS) Mission Package Integrator program, Littoral Combat ship (LCS) Flight 0 Preliminary Design program, and the Navy's Mobile User Objective System (MUOS) program. The research will then conclude with the identification of characteristics of a successful MOSA program procurement and resulting contract.



Introduction

Open Systems and Modular Open Systems Approach (MOSA)

The modular open systems approach is considered an enabler to successfully implementing an evolutionary acquisition strategy. While Evolutionary Acquisition focuses on rapidly developing and producing weapon systems incrementally, with each increment providing an increasing level of operational capability, the modular open systems approach ensures access to the latest technologies and products and facilitates affordable and supportable system development and modernization of fielded assets (Defense acquisition guidebook, 2004).

MOSA Principles

Program managers implementing an open systems approach should consider the five MOSA principles listed below and described in the Open Systems Joint Task Force Guide to MOSA (Defense acquisition guidebook, 2004; OSJTF guide, 2004).

1. Establish an Enabling Environment

This involves establishing supportive requirements, business practices, and strategies for technology development, acquisition, test and evaluation and product support needed for the effective development of open systems. Also included are the following: assigning responsibility for MOSA implementation, ensuring appropriate experience and training on MOSA, continuing market research and proactive identification, and overcoming of barriers or obstacles that can potentially slow down or even, in some cases, undermine effective MOSA implementation.

2. Employ Modular Design

Effective modular design refers to the four major modular design tenets of Cohesiveness (the module contains well-focused and well-defined functionality), Encapsulation (the module hides the internal workings of its behavior and its data), Self-Containment (the module does not constrain other modules), and Highly Binded (the modules use broad modular definitions to enable commonality and reuse). This principle states that by following these four tenets, each module will be designed for change, and the interface to each module will be defined in such a way as to reveal as little as possible about its inner workings which facilitate the standardization of modular interfaces.

3. Designate Key Interfaces

This principle stresses that designers should group interfaces into two categories—key and non-key interfaces. Such distinction enables designers and configuration managers to distinguish among interfaces that exist between technologically stable and volatile modules, between highly reliable and more frequently failing modules, between modules that are essential for net-centricity and those that do not perform net-centric functions, and between modules that pass vital interoperability information and those with least interoperability impact. Employing this principle will help acquisition managers effectively manage hundreds and, in some cases, thousands of interfaces that exist within and among systems.



4. Use Open Standards

This principle stresses that standards should be selected based on maturity, market acceptance, and allowance for future technology insertion. Since interface standards must be well defined, mature, widely used and readily available, the principle refers to the order of priority given to the use of open interfaces. Preference is given to the use of open interface standards first, the de facto interface standards second, and finally, government and proprietary interface standards. Basing design strategies on widely supported open standards increases the chance that future changes will be able to be integrated in a cost effective manner.

5. Certify Conformance

This principle focuses on the verification and validation of a system's openness through the use of such mechanisms as interface control and management as well as proactive conformance testing and certification. Using these mechanisms, the program manager ensures that the system and its component modules conform to the external and internal open interface standards allowing plug-and-play of modules, net-centric information exchange, and re-configuration of mission capability in response to new threats and evolving technologies. A preference is made for the use of the MOSA Program Assessment and Review Tool (PART) developed by the Open Systems Joint Task Force (OSTJ) to assess the compliance with open systems policies and ensure that acquisition programs are properly positioned to reap the open systems benefits (Defense acquisition guidebook, 2004).

Program offices should follow these five MOSA principles to guide their efforts in ensuring access to the latest technologies and products, achieving interoperability, and facilitating affordable and supportable modernization of fielded assets. Following these principles will also be needed to ensure delivery of technologically superior, sustainable, and affordable increments of militarily useful capability within an evolutionary acquisition strategy context. As program offices use these five MOSA principles to guide their implementation of a modular open system approach in their acquisition programs, the implications of these principles should permeate throughout all aspects of the acquisition process. One major area in which the MOSA strategy should have a significant influence is the contracting process. The implications of using a MOSA approach to acquisition and contracting will be discussed in the next section of this paper.

The next section of this research will focus on the various contractual documents prepared, contractual language developed, and contracting activities performed during the contracting process, as well as on the implications of using a modular open systems approach on those documents, language, and activities. This contracting process consists of the following phases—procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout (Garrett & Rendon, 2005).

Procurement Planning

Procurement planning is the first contracting phase and involves identifying which business needs can be best met by procuring products or services outside the organization.



This process involves determining whether to procure, how to procure, what to procure, how much to procure, and when to procure. Key practice activities included within the procurement planning phase include determining the initial scope of work or the description of the product in the acquisition, conducting market research to analyze the level of technologies and types of products and services available in the marketplace, determining funds availability, and developing initial cost and schedule estimates as well as manpower resources. Developing an initial Statement of Work (SOW) and Work Breakdown Structure (WBS) are also included in the procurement planning phase. Conducting an initial integrated assessment of contract-type selection, risk management, and an initial analysis of potential contract terms and conditions is also part of the procurement planning process (Garrett & Rendon, 2005). It should be noted that many of the contractual documents developed in the procurement planning phase are initial draft documents, such as SOWs, WBSs, project scope statements, and funding and manpower estimates. These are initial draft documents simply because they are typically modified and revised as the acquisition program office becomes more knowledgeable of the business and technical aspects of the program. Industry business and technical knowledge are typically acquired through the use of market research activities, industry conferences, and Requests for Information (RFIs).

Market Research

Market research is a critical step in the acquisition of open systems-based programs. The Federal Acquisition Regulation (FAR) states that agencies must conduct market research appropriate to the circumstances before developing new requirements documents for an acquisition by that agency and before soliciting offers for acquisitions with an estimated value in excess of the simplified acquisition threshold (FAR 10). It is during this process that the buyer determines the availability of COTS products and open systems-based products, as well as determines if these available products will meet the specified acquisition requirements. Market research activities focus on acquiring knowledge of current market practices, technologies, capabilities, products, and future trends in areas related to the acquisition. Given the objectives of using a modular open systems approach, market research is extremely critical in leveraging commercial investment, enhancing access to cutting-edge technologies and products and increasing competition. Market research should also be used in an open systems-based acquisition to determine the capabilities of contractors to use open systems approaches and to comply with contractual requirements for using open systems approaches. A market research technique is the benchmarking of industry best practices related to the development and use of open systems in product development (Garrett & Rendon, 2005).

Industry Conferences

Industry conferences are also used for obtaining industry knowledge related to the development of the solicitation (as well as the acquisition in general). Industry conferences can provide valuable information in the areas of state of technologies and market practices concerning the use of open systems and the development of open systems architectures in product development and acquisition. Industry conferences serve two main purposes—to inform industry about the technical requirements and acquisition planning of the program and to solicit industry inputs for the pending program (Office of the Undersecretary of Defense (AT&L), 2005).



Request for Information

Requests for Information (RFIs) are used as a market research technique for the purpose of gathering information from industry to be used in planning an acquisition. Government agencies typically use RFIs as a source of information for understanding, developing, defining and refining the acquisition requirement. It should be noted that RFIs are not solicitation notices, nor do they commit the government to issuing a solicitation or even continuing with the acquisition. RFIs are also used as a method for identifying potential offerors for an upcoming acquisition. These types of RFIs are also known as Sources Sought Synopses.

Given the objectives of managing an acquisition using a modular open systems approach, RFIs, along with other market research techniques, are extremely valuable for acquiring knowledge of current market practices, technologies, capabilities, products, and future trends in areas related to the acquisition. This information will effectively support the MOSA objectives of leveraging commercial investment, enhancing access to cutting edge technologies and products, and increasing competition. RFIs can be effective in determining the capabilities of contractors to use open systems approaches and to comply with contractual requirements for using open systems approaches. RFIs can also provide information on a potential offeror's past performance in integrating technical and management processes in prior programs (Office of the Undersecretary of Defense (AT&L), 2005).

Solicitation Planning

The second phase of the procurement process is Solicitation Planning, which involves the process of preparing the solicitation documents needed to support the acquisition. This is a critical phase of the procurement process since it is during this phase that the work statements, specifications and other exhibits, standard terms and conditions, as well as special contract requirements are developed, revised, and finalized. Key practice activities within the solicitation planning process include using standard procurement forms and documents such as solicitation templates, model contracts, specifications and item descriptions, solicitation provisions, and contract terms and conditions (Garrett & Rendon, 2005). Federal Acquisition Regulations (FAR) require contracting officers to prepare solicitations and contracts using the FAR-specified uniform contract format to the maximum extent possible, as well as the required solicitations provisions and contract clauses

The solicitation for an acquisition program using an open systems approach will require specific language unique to the use of a modular open systems approach. Thus, the procurement documents that make up the solicitation should incorporate the specific language that reflects the preference or mandated use of a modular open systems approach in the acquisition program. Section C (Description/Specification/Statement of Work), Section L (Instructions, Conditions, and Notices to Offerors or Respondents), and Section M (Evaluation Factors for Award) are the primary parts of the solicitation that are influenced by the particular engineering approach to the acquisition program. These sections are the core of the solicitation and directly influence the offeror's proposal and the resulting contract.

It is the documents in this section that will be most effective in communicating the government's requirements for using an open systems approach in the acquisition. Thus, acquisitions that are using a modular open systems approach should have specific and unique documents and language within these solicitation sections and documents. The procurement



documents and specific solicitation language that will be discussed in this solicitation planning phase include Section C documents such as the Statement of Objective (SOO)/Statement of Work (SOW) and Preliminary System Specification, and Section L documents which consist of the Instruction to Offerors (ITOs). The discussion of the Source Selection phase of the contracting process will address Section M, Evaluation Factors for Award.

Section C of the solicitation consists of descriptions, specifications, and statements of work for the acquisition program. This section of the solicitation contains the detailed description of the products to be delivered or the work to be performed under the contract.

System Performance Specification

A critical Section C document is the performance specification. The system performance specification defines the government's performance requirements for the system and should reference any industry and approved military specifications and standards. Typically, the system performance specification in the solicitation is considered a "preliminary system performance specification," and the offeror responds to the solicitation with a formal system performance specification in its proposal. The solicitation must be clear in delineating whether the government will consider offeror-proposed revisions to the preliminary performance requirements that may be cost effective. The offerors run the risk of being declared non-responsive to the solicitation for proposing revised performance requirements (Office of the Undersecretary of Defense (AT&L), 2005). In acquisition programs using a modular open systems approach, the system performance specification plays a critical role in communicating the government's requirement for communicating "openness" and delineating requirements for open systems. Typically, the performance specification is developed using the requirements document that was the basis for initiating the acquisition. These requirements documents, such as the Operational Requirements Documents (ORD) or Capability Development Document (CDD), will be extensively used in developing the performance specification.

Statement of Work

Another critical document in Section C of the Solicitation is the Statement of Work (SOW). Traditionally, the government has used a SOW in its major acquisition programs. The solicitation Statement of Work (SOW) describes the actual work to be done by means of specifications or other minimum requirements, quantities, performance date, and requisite quality (Garrett & Rendon, 2005). The offerors propose their management, technical, and cost approach to meeting the requirements of the SOW in their proposal. Already a critical part of the solicitation package, the SOW takes on even more of a significant role in an acquisition using an open systems-based approach. In these acquisition programs, the SOW must be clear and concise in communicating the requirements that contractors must comply with in terms of meeting open systems standards and incorporating open system components in the development of the total system.

SOW specifically tells the contractor that a primary consideration in selection of equipment shall be the impact to the overall modular open systems architecture. Additionally, the SOW stresses the importance of long-term supportability, interoperability, and growth for future modifications as major factors in the contractor's selection of equipment. Furthermore, the SOW is specific in requiring the contractor to use an architectural approach that will provide a viable technology insertion methodology and refresh strategy as well as to maximize commonality of components used in the CEDS equipment across all product baselines. Finally,



the contractor is required to develop metrics to measure the degree of success in achieving the commonality goals (US Navy, 2005, September 9c).

The SOW in solicitations and resulting contracts for acquisition programs using an open systems approach is a critical tool for delineating the contractor's requirements and responsibilities in performing the contract.

Statement of Objectives

With the continued emphasis on Acquisition Reform and the streamlining of the acquisition process, many government agencies are now using a Statement of Objectives (SOO) instead of a SOW in the solicitation. The SOO is a government-prepared document incorporated into the RFP that states the overall objectives of the solicitation. Typically, the SOO is a very short document, usually under 10 pages, that clearly delineates the program objectives and the overall program approach of the acquisition. The purpose of the SOO is to provide the maximum flexibility to each offer to propose an innovative development approach (Garrett & Rendon, 2005). The offerors respond to the government's SOO with a SOW providing the details of its proposed management, technical, and cost approach for delivering the requirements of the acquisition. Therefore, instead of the government developing the SOW with detailed instructions and requirements, the government provides the SOO with only the top level objectives of the acquisition; the offerors then respond with the proposed detailed approach in their SOW. Thus, the use of the SOO by the government encourages offerors to propose innovative approaches and flexible design solutions (Meyers & Oberndorf, 2001). With this in mind, it can be clearly seen how SOOs definitely support the use of a modular open systems approach acquisition program.

Contract Data Requirements List (CDRL)

Another critical document in the solicitation is the Contract Data Requirements List (CDRL), DD Form 1423. The CDRL is a list of all authorized data requirements for a specific procurement that forms a part of the contract. CDRLs should be linked directly to the required tasks in the Statement of Work (SOW) (Office of the Undersecretary of Defense (AT&L), 2005). In relation to open systems and using an open systems approach in the acquisition, the government can request certain data or even demonstrations from the contractor, as part of the contract performance requirements.

Instructions to Offerors

In addition to the documents in Section C of the Solicitation, such as the System Performance Specification, SOO/SOW, and CDRL, specific language should also be included in Section L of the solicitation as well. Section L provides the Instructions to the Offerors (ITOs) for developing the proposals in response to the solicitation.

Section L of the solicitation specifies the format and content of proposals, as well as information or proposal preparation instructions that are not included elsewhere in the solicitation (Engelbeck, 2002). Acquisitions using a modular open systems approach have a critical need for providing specific instructions to offerors concerning the development of proposals and the offeror's adherence to the use of open systems in the development process. Typically, the ITOs reference other documents in the solicitation package such as system technical architecture requirements and design guidance and standards for open architectures.



The ITO typically specifies the factors to be used in the proposal evaluation phase of the source selection. These evaluation factors are traditionally categorized as technical, cost, and management. In acquisitions using a modular open systems approach, usually the technical evaluation factor specifies the ITO requirements related to the acquisition's open-systems requirements.

Solicitation

Solicitation is the third phase of the procurement process and is the process of obtaining bids and proposals from prospective sellers on how to meet the objectives of the project. The solicitation phase is critical to the overall acquisition strategy because it is this phase that executes the procurement planning strategy for a full and open competition or a sole source procurement. Some key practice activities within the Solicitation phase include conducting market research and advertising to identify new sources of supplies and services for the purpose of developing a list of interested offerors (Garrett & Rendon, 2005). These offerors will receive the solicitation requesting the proposal. Another key practice activity in the Solicitation phase includes conducting a pre-solicitation or pre-proposal conference to ensure that all prospective contractors have a clear, common understanding of the technical and contractual requirements of the acquisition (Garrett & Rendon, 2005). In this section on the Solicitation process, the use of Draft RFPs during the solicitation process and the implications of using a full and open competition or a sole source procurement strategy for open systems-based acquisitions will be discussed.

Draft RFPs

Typically, the process of issuing a solicitation and then later amending the solicitation to incorporate corrections, updated specifications, and revised language results in an extended and prolonged acquisition schedule. One of the goals of the solicitation process is to develop and structure a current and complete solicitation that will result in accurate, complete, and competitive proposals from prospective contractors in the shortest amount of time. The use of Draft RFPs has become a proven best practice in the solicitation planning process (Garrett & Rendon, 2005). Issuing a Draft RFP to interested offerors allows for additional industry feedback on any aspect of the proposed acquisition. With this "early and up-front" feedback from interested offerors to the contracting office, the contracting office can continue to improve and enhance the solicitation while it is still being developed, thus saving time and shortening the acquisition schedule.

Procurement Strategy

In developing a procurement strategy for an acquisition program, the traditional options include conducting a full and open competition or a sole source procurement. Statutory requirements, specifically 10 U.S.C. 2304 and 41 U.S.C. 253, require that contracting officers promote and provide for full and open competition in soliciting offers and awarding contracts (FAR, 6.101). There are certain statutory authorities permitting contracting without providing for full and open competition (sole source), as discussed in FAR 6.302. The benefit of full and open competition includes obtaining quality goods and services at a fair and reasonable price. Allowing all responsible offerors to compete also allows the government to leverage the forces of the marketplace to include leading technologies and innovative management approaches in developing solutions. Obviously, the benefits of pursuing a full and open competition fully support the objectives of managing an acquisition program using an open systems approach.



Since the underlying concepts of an open systems-based acquisition focus on the ability to insert cutting-edge technology as it evolves, the commonality and reuse of components among systems, the enhanced access to emerging technologies and products from multiple suppliers, the increased ability to leverage commercial investment, and an increase in competition, it would seem appropriate to pursue a full and open competition strategy for the acquisition. It should be noted that in some cases, especially at the platform level, the use of a full and open competition strategy is not possible.

The acquisition of the Virginia Class Submarine is an example of the need for other than full and open competition strategies.

A unique procurement strategy is the use of a “rolling down-select” procurement strategy approach. In this approach, a full and open competition is initially conducted, and multiple contracts are awarded. These contracts are typically used early in the acquisition lifecycle, such as for the development of preliminary designs. Once the designs have been submitted and evaluated, a down-select of the initial contractors to a single contractor is conducted for the development and production of the actual system. The acquisition strategy may involve multiple “down-selects,” depending on how many evaluation phases the buyer desires. For example, there may be an initial full and open competition for conceptual development contracts, a down-select to a smaller number of the original contractors for preliminary designs, another down-select to even a smaller number of contractors for prototype development, and finally, a final down-select to a single contractor for full development and production of the actual system.

As previously stated, the benefits of pursuing a full and open competition fully support the objectives of using an open systems approach in an acquisition program. Opening the acquisition to allow all qualified offerors to participate enables the government to enhance access to cutting-edge technologies and products from multiple suppliers, to have the ability to insert cutting-edge technology as it evolves, and to have the increased ability to leverage commercial investments in technology. Of course, at some point in time, the government will need to establish a relationship with one contractor; otherwise having multiple contractors producing the same system may be cost prohibitive. The major issue is determining how many contracts to award following a full and open competition and how to structure the “down-select” process to determine the single production contractor.

Source Selection

Source Selection is the fourth phase of the contracting process and involves the process of receiving proposals and applying evaluation criteria to select the contractor. Key practice activities within the source-selection process include using evaluation criteria focusing on management, technical, and cost, tailoring the basis for award to either lowest cost/technically acceptable or best value, and taking into consideration an offeror’s past performance in evaluating proposals (Garrett & Rendon, 2005).

Evaluation Factors

Section M of the solicitation specifies how the buyer will evaluate the factors identified in the Instructions to Offerors (ITO) in Section L. As previously stated, Section L specifies the factors to be used in the proposal evaluation phase of the source selection, while Section M specifies how the factors will be used in the proposal evaluation process. These evaluation factors are traditionally categorized as technical, cost, and management. In acquisitions using a



modular open systems approach, it is usually the technical evaluation factor that specifies the ITO requirements related to the acquisition's open system requirements. The relationship between cost and non-cost factors (such as quality, technical, and past performance), as well as how they will be used in the source-selection decision, are described in Section M. The two major evaluation strategies are Lowest Price/Technically Acceptable (LPTA) or best value. Best value refers to an evaluation strategy where trade-offs are made in relation to cost and other factors. Thus, in an LPTA source selection, the offeror proposing the lowest price, technically acceptable offer will be awarded the contract. However, in a best-value source selection, the contract award may be made to "other than the lowest priced, technically acceptable offeror," based on a trade-off among cost, technical, and past performance factors. It is important that the proposal evaluation strategy should be tailored to meet the objectives of the acquisition strategy (Garrett & Rendon, 2005). The use of the best-value evaluation strategy is appropriate for acquisitions that involve requirements that are less definitive, require more development work, or the acquisition has greater performance risk, and where more technical or past performance considerations play a dominant role in the source-selection decision (FAR, 15.101). Obviously, an acquisition that involves the use of a modular open systems approach in the development of the system would involve a less definitive requirement, require more development work, have greater performance risk, and involve more technical or past performance considerations playing a dominant role in the source-selection decision. Thus, the use of a best value evaluation approach is desired for these types of acquisitions (Meyers & Oberndorf, 2001).

When using the best-value trade-off process, it is important for all evaluation factors and significant sub-factors that will affect contract award and their relative importance to be clearly stated in the solicitation; and the solicitation should state whether all evaluation factors other than cost or price, when combined, are significantly more important than, approximately equal to, or significantly less important than cost or price. This process permits trade-offs among cost or price and non-cost factors and allows the government to accept other than the lowest priced, technically acceptable proposal (FAR, 15.101-1).

Basis for Award

Even more critical in acquisition programs using a MOSA approach is the language used for the basis for award. The basis for award describes the government's method for selecting the contractor. The most critical part of the basis for award language is the weight, or relative importance, given to the various proposal evaluation factors. It is this specific language in which the buyer communicates to the offerors the priority, or relative importance, of the evaluation factors. Acquisition of modular open systems approach-based programs should be specific in communicating the relative importance of the evaluation factors. In addition, and more importantly, acquisition of modular open systems approach-based programs should place greater importance on proposal evaluation factors related to technical-related factors.

The source-selection process is obviously critical to the overall acquisition program. It is in this phase where the offeror's proposal is evaluated to determine the best value for the government. It should be noted that the Instructions to Offerors (ITOs) in Section L and the evaluation factors and criteria stated in Section M of the solicitation must be consistent and interrelated. These are the areas carefully scrutinized by offerors in making their bid/no bid determination, as well as in developing their proposals. In addition, the evaluation factors and criteria should be tailored to meet the objectives of the acquisition strategy (Garrett & Rendon, 2005). In acquisition strategies that are based on the use of a modular open systems approach,



it is critical that Sections L and M are carefully crafted and structured to communicate and incentivize the offerors to develop management, technical, and cost approaches appropriate for achieving the open systems goals of the acquisition.

Once the contract is awarded, the government and contractor relationship then shifts to a performance measurement and management focus in which the government manages the contractor's performance to ensure that acquisition objectives are achieved. One way of ensuring the contractor meets these acquisition objectives is through the use of appropriate contract types and contract incentives, which are administered during the contract administration phase of the acquisition. This is discussed in the next section of this report.

Contract Administration

Contract Administration is the fifth phase of the contracting process and entails managing the relationship with the contractor and ensuring that each party's performance meets the contract requirements. During contract administration, the government's focus is on managing the contractor's cost, schedule, and performance. Key practice activities within the contract administration process include using an integrated team approach for monitoring the contractor's cost, schedule, and performance, and having an established process for administering incentive and award-fee provisions (Garrett & Rendon, 2005). These incentives and award fees are tools used to motivate and incentivize the contractor to meet specific performance standards of the contract. These incentive techniques will be discussed in more depth later in this section.

Although the purpose of this report is not to present a full discussion on the various contract types and contract incentives, a brief description of the major categories of contract types and related contract incentives will be presented. The purpose here is to briefly identify which contract types and contract incentives have been previously used in acquisition programs pursuing a modular open systems approach. References will be made to a recent assessment of acquisition programs by the Navy Open Architecture Enterprise Team (OAET) in support of the Navy Program Executive Office-Integrated Weapon System (PEO-IWS) (US Navy, 2005, September 27).

Contract Types

The Federal Acquisition Regulation (FAR) identifies two major contract categories: cost reimbursement contracts and fixed-price contracts (FAR, 16). These contract-type categories refer to the method of compensation due to the contractor for the performance of the contract.

In the Fixed-price Contract category, the contractor agrees to provide specified supplies or services in return for a specified price, either a lump sum or a unit price. In addition, the price is fixed and is not subject to change regardless of the contractor's actual cost experience. Only if the contract is modified is the price subject to change (Garrett & Rendon, 2005). There are various types of fixed-priced contracts such as Firm Fixed Price (FFP), Fixed Price with Economic Price Adjustment (FP-EPA), and Fixed Priced Incentive (FPI).

In the Cost Reimbursement contract category, the contractor agrees to provide a best effort in performing the requirements of the contract, which is typically broadly defined in terms of specifications. In return, the contractor is reimbursed for all allowable costs up to the amount specified in the contract. Cost allowability is governed by the FAR (FAR, 31). Various types of



Cost Reimbursement contracts include Cost Sharing (CS), Cost Plus Fixed Fee, (CPFF), Cost Plus Incentive Fee (CPIF), and Cost Plus Award Fee (CPAF).

Contract Incentives

Contracts may include incentives to provide additional motivation to the contractor for meeting or exceeding certain cost, schedule, or performance objectives. Contract incentives are basically of two types—objectively based incentives and subjectively based incentives.

Objectively based incentives use a pre-determined formula to determine the rewards (increase of profit or fee) or the penalties (reduction of profit or fee) due to the contractor. Examples of objectively based incentives include Fixed-priced Incentive and

Cost Plus Incentive Contracts

Subjectively based incentives include Award Fee or Award Term contracts. These incentives use a subjective evaluation to determine if any additional fee or term (for service contracts) is due to the contractor. Based on a subjective evaluation of the contractor's effort to exceed specific requirements in terms of cost, schedule or performance as specified in the Award Fee Plan or Award Term Plan, the contractor may be entitled to earn additional fee or term on the contract.

The biggest challenge in using incentive contracts and award fee/term contracts is the ability to structure an effective incentive tool that will successfully motivate the contractor to perform in specified areas and exceed the performance requirements. It is particularly important to structure appropriate incentive arrangements that will result in the contractor applying additional emphasis in the areas important to the government. In acquisition programs using a modular open systems approach, the government will want to incentivize the contractor to meet higher levels of “openness” in the design and development of the system.

Acquisition programs using a modular open systems approach are challenged with incentivizing the contractor to achieve the required levels of “openness” by meeting or exceeding the technical requirements of the contract, as well as cost and schedule requirements. The Award Fee type of incentive has been traditionally used for motivating the contractor to excel in technical performance. All of the programs referenced in conducting this research used the Award Fee process as a tool for incentivizing the contractor to achieve a certain level of openness in the design and development of the weapon system

A new type of incentive tool that is currently very successful is the Award Term incentive. Award Term is similar to Award Fee; it differs only in that an Award Term contract ties the length of the contract's period of performance to the performance of the contractor. Contractors with good performance may have the term of the contract extended, or contractors with poor performance may have the contract term reduced (Garrett & Rendon, 2005).

The selection of contract types and contract incentives requires careful planning, implementation, management, and measurement to ensure its success in incentivizing contractors and improving performance (Garrett & Rendon, 2005). Programs that are encouraging the use of a modular open systems approach in the development of the system should incorporate Award Fee and Award Term incentives. This is especially true when a Statement of Objectives (SOO) is used to describe the government's required outcomes and



overall objectives and when the contractor has the flexibility to be innovative in proposing its management and technical approach towards meeting those outcomes and objectives.

Contract Closeout

The final phase of the contracting process is Contract Closeout. Contract Closeout is the process of verifying that all administrative matters are concluded on a physically complete contract. This involves accepting final deliveries and making final payment to the contractor, as well as completing and settling the contract and resolving any open items. Key practice activities within the contract closeout phase include using checklists and forms for ensuring proper documentation of closed contracts and maintaining a “lessons learned and best practices” database for use in future contracts and projects (Garrett & Rendon, 2005). The contract closeout phase is often forgotten and has traditionally been considered an administrative burden or relegated to a clerical or non-essential task. An important aspect of completing and closing out the contract is conducting a final evaluation of the contractor's performance on the contract in terms of meeting cost, schedule, and performance objectives. This final contractor evaluation will be used as a past-performance evaluation of the contractor in future contract competitions and source selections.

As previously stated, contractor past performance is a critical evaluation factor for major source selections and is listed as an evaluation factor under Section M of the solicitation. Ensuring the final contractor performance evaluation is completed during the contract closeout process is critical in ensuring that information is available for use in a future source selection. In acquisitions using a modular open systems approach, a critical proposal evaluation factor listed in Section M of the solicitation should be the contractor's past performance and recent experience in working in an open systems approach environment. Past performance is a mandatory proposal evaluation criterion for major source selections in accordance with FAR 15.304. The Department of Defense (DoD) uses the Contractor Performance Assessment Report (CPAR) to conduct periodic and final evaluation of the contractor's performance. Systems engineering is a major contractor past-performance assessment element, and the CPAR should be used to evaluate the contractor's adherence to open systems standards and MOSA requirements on open systems-based acquisitions. Using the CPAR evaluation tool, the government can document excellent or poor contractor performance in terms of meeting contract “openness” requirements, and this documentation can then be used in future source selections (Office of the Undersecretary of Defense (AT&L), 2005).

Summary, Conclusions, and Recommendations

The research identified the following characteristics of a successful MOSA program procurement and resulting contract: Early involvement and participation of industry in the development of requirements and acquisition strategy; shared roles between the government and contractors in the development of the system specification and statement of work; the use of a best-value contract strategy consisting of the evaluation of offeror's technical, schedule, and past performance, as well as the offeror's cost and management approach; the use of a contract structure consisting of contractor incentives for meeting higher levels of “openness”; the documentation of contractor's past performance in meeting “openness” requirements, as well as the documentation of lessons learned and best practices on open systems.



Finally, the report recommends that further research be conducted on the following areas: Other DoD acquisition programs to evaluate the extent to which the identified MOSA contracting best practices and characteristics have been implemented in those departments; the effectiveness of award fee and award term provisions in incentivizing contractors to achieve higher levels of openness in designing and developing weapon systems, given the recent GAO findings concerning the use of award fees in DoD contracts; an analysis of current major weapon system acquisition programs status of MOSA implementation that is a required milestone review briefing point to the program's Milestone Decision Authority; the results of any OSJTF Program Assessment Rating Tool (PART) internal MOSA assessments on current defense acquisition programs; and, finally, the type and extent of training that is currently provided to contracting officers in the area of MOSA-based acquisition strategies.

This is an abbreviated version of the complete research report. The complete research report may be accessed from the Naval Postgraduate School website

www.nps.navy.mil/gsbpp/acqn/publications.

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